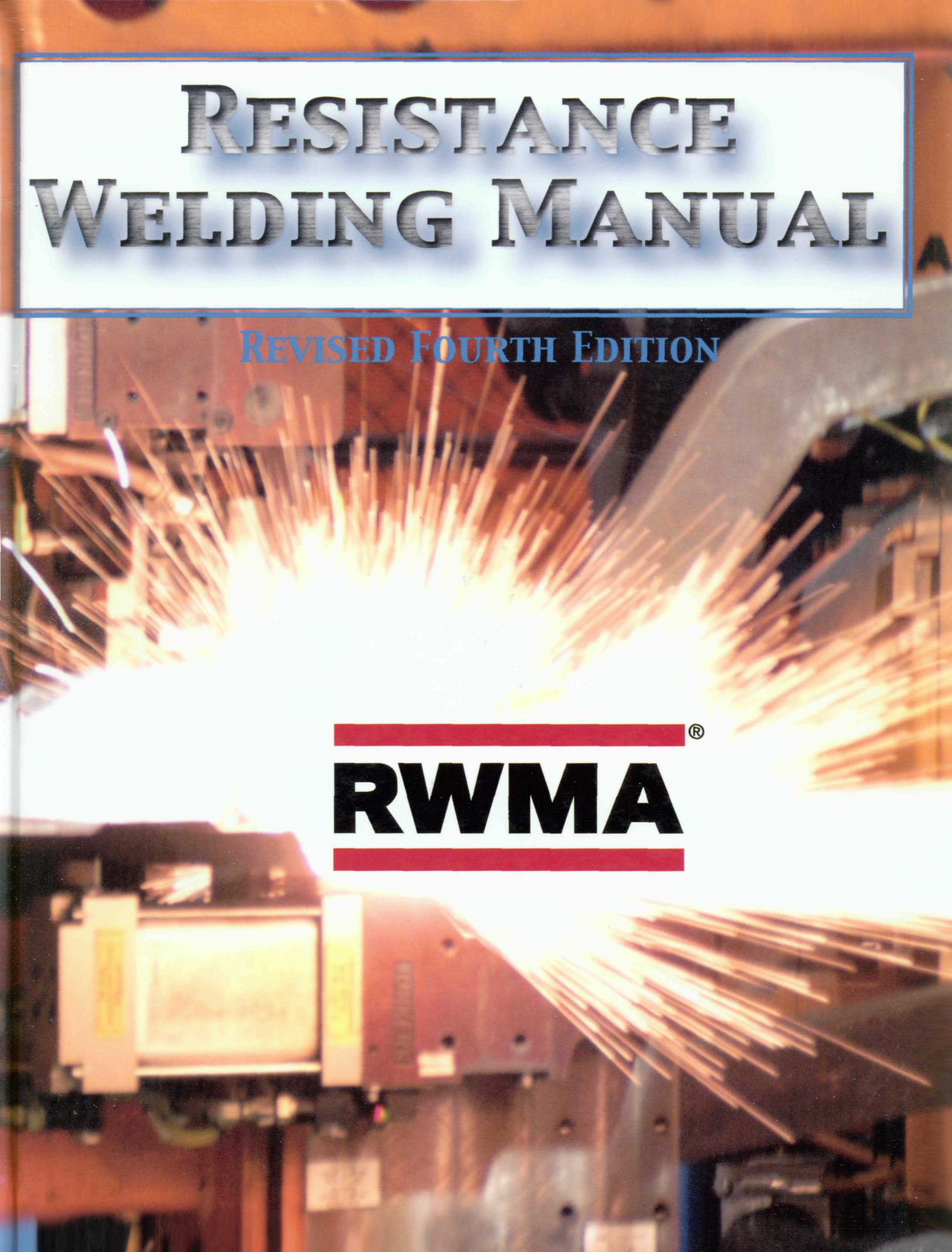
RESISTANCE WELDING MANUAL

REVISED FOURTH EDITION



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SECTION 1

1

Fundamentals Of Resistance Welding

INTRODUCTION

Welding consists of the joining of two or more pieces of metal by the application of heat and sometimes of pressure.

Resistance welding embraces that branch of the welding art in which the welding heat in the parts to be welded is generated by the resistance offered by these parts to the passage of an electrical current. It differs from other forms of welding in that no extraneous materials, such as fluxes, filler rods, etc. are used; therefore, the metallography of the weld is not complicated by the addition of these materials. Resistance welding further differs from the fusion welding processes, by utilizing the application of mechanical force to forge the heated parts together. The effect of the force is to refine the grain structure, thus producing a weld with physical properties, in most cases, equal to the parent metal, and sometimes even superior.

Resistance welding machines and their operation often appear mysterious to the layman when he sees good welds being made quickly and easily. The same characteristics may lead the beginner to believe the process more simple, or more generally applicable, than is true. It is the aim of this introductory discussion to review the fundamentals of the process and to discuss some of the more basic details.

Welding is really a metallurgical process. Ordinary iron has been described as a suspension of ferrite crystals of variable compositions in a matrix of its own impurities. It is this matrix of impurities that increases the electrical resistance of all metals which is of real importance in electrical resistance welding.

RESISTANCE WELDING PROCESSES

Figure 1.1 illustrates, in graphic form, the resistance welding processes[1] and their relation to one another. It should be noted from this chart that the general subject of resistance welding may be broken into two general classifications according to the method of joining the parts. (The same classifications may also be applied to other welding processes).

1 See also the latest revision of *Standard Welding Terms and Definitions*, an American Welding Society (AWS) publication.